Nematology Circular No. 117
April 1985

Fla. Dept. Agric. & Consumer Serv.
Division of Plant Industry

CITRUS DECLINES CAUSED BY NEMATODES IN FLORIDA. III. CITRUS SLUMP

J. H. O'Bannon[1] and A. C. Tarjan[2]

"Citrus slump" is a descriptive term coined for a complex of disease symptoms associated with Pratylenchus species on citrus. Similar symptoms are associated with "spreading decline" which is caused by Radopholus similis (Cobb) Thorne (the burrowing nematode), or "slow decline" that is the result of infection by Tylenchulus semipenetrans Cobb (the citrus nematode). Unthriftiness or lack of vigor, sparse foliar and terminal growth, small size and poor yield of fruit, a tendency of foliage to wilt readily during droughts, and a noticeable lack of foliage luster are symptoms common to a number of maladies caused by physiological and/or pathological disorders. What then is the role of Pratylenchus in the "citrus slump" disease complex? To make such a determination, the influence of two Pratylenchus species must be evaluated. One species is found widespread in citrus groves, while the other is rarely encountered. Previously published circulars (4,5) give additional information on the organisms discussed here.

An earlier report of a survey conducted in Florida (14) stated that 9 out of 10 Florida groves were infested with lesion nematodes, Pratylenchus spp. Pratylenchus brachyurus (Godfrey) Filipjev & Schuurmans-Stekhoven was the predominant species isolated, while P. coffeae (Zimmerman) Filipjev & Schuurmans-Stekhoven was isolated only from 5 groves.

The first published report on association of lesion nematodes with citrus in Florida was by Suit and DuCharme in 1953 (12). The pathogenicity of P. brachyurus to citrus was first reported in Florida in 1967 by Brooks and Perry (1), who determined that P. brachyurus caused growth reduction of sour orange seedlings in greenhouse tests. Field studies showed that young trees are adversely affected to some extent, and it was observed that damage decreases with tree age (10). This and other studies (8) have shown that although P. brachyurus is a participant in the citrus slump complex, mature trees are not greatly influenced by this nematode except when other adverse conditions such as severe droughts occur, which place trees under severe stress. Otherwise, P. brachyurus is not considered to be a pathogen of economic importance to citrus.

Pratylenchus coffeae invades, feeds in, and migrates through, cortical root tissues (Fig. 1) where it creates burrows and cavities similar to those caused by Radopholus similis. The pathogenicity of P. coffeae to citrus was suspected by Feldmesser and Hannon (2) from greenhouse tests. In later tests, eight rootstocks evaluated for resistance or susceptibility to P. coffeae all were found to be highly susceptible (9) with growth reduced as much as 22% after one year (11). Four of these rootstocks, 'Algerian navel', 'Carrizo' citrange, 'Milam' lemon, and 'Ridge Pineapple' are resistant to Race 1 of the burrowing nematode that attacks citrus (R. citrophilus = R. similis) (3,7). The others, 'Cleopatra' mandarin, 'Estes' rough lemon, rough lemon, and sour orange were equally susceptible to P. coffeae. An example of the type of damage P. coffeae can inflict compared to a noninfected tree of the same age is shown in Fig. 2. Host tests showed that 125 citrus species, hybrids, and relatives are known hosts of P. coffeae (6).

---

[1]Chief of Nematology, Nematology Bureau, P. O. Box 1269, Gainesville, FL 32602.

[2]Professor of Nematology, Dept. Entomology & Nematology, Univ. Fla., Gainesville, FL 32611.

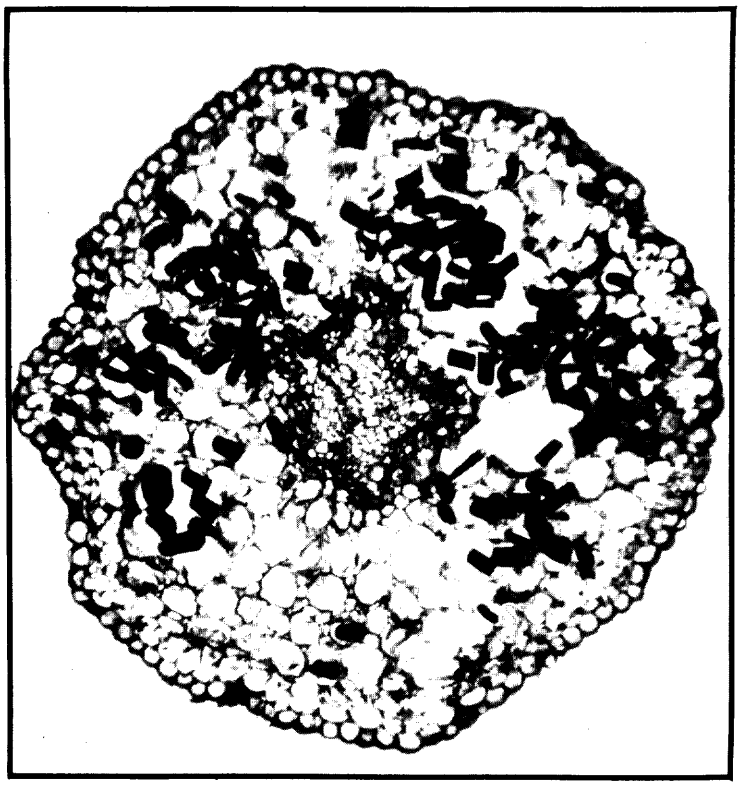

Fig. 1. Cross section of citrus root infected with the coffee lesion nematode, Pratylenchus coffeae. Note nematodes, stained black in this section, throughout root cortex.

Fig. 2. Four-year old Orlando Tangelo on Cleopatra mandarin rootstock. Left: tree infected with Pratylenchus coffeae; right: noninfected tree.

Another similarity between P. coffeae and R. similis is the ability to migrate. Tarjan (13) reported that P. coffeae migrated laterally nearly 3 feet in 19 months, while another study (11) reported lateral movement of 15 feet between rows of trees spaced 18 feet apart, spreading the nematodes to adjacent noninfested trees. Thus, it was demonstrated that P. coffeae is capable of migrating to nearby citrus trees and inciting symptoms similar to spreading decline under field conditions (11). Interestingly enough, controlled studies (9) have shown that P. coffeae is as damaging to citrus as R. similis. Fortunately, P. coffeae is not widely distributed in citrus groves in the state. Sanitation and site certification play a major role in preventing the spread of this potentially important causal agent.

LITERATURE CITED:

1. Brooks, T. L., and V. G. Perry. 1967. Pathogenicity of Pratylenchus brachyurus to citrus. Plant Dis. Reptr. 51:569-573.
2. Feldmesser, J., and C. I. Hannon. 1969. Susceptibility of two citrus rootstocks to Pratylenchus spp. Plant Dis. Reptr. 53:603-607.
3. Kaplan, D. T., and J. H. O'Bannon. 1985. Occurrence of biotypes in Radopholus citrophilus. J. Nematol. (in press)
4. MacGowan, J. B. 1978. The lesion nematode, Pratylenchus coffeae, affecting citrus in Florida. Fla. Dept. Agric. & Consumer Serv., Div. Plant Ind., Nematol. Circ. No. 37. 2 pp.
5. _____. 1978. The lesion nematode, Pratylenchus brachyurus, infecting citrus. Fla. Dept. Agric. & Consumer Serv., Div. Plant Ind., Nematol. Circ. No. 42. 2 pp.
6. O'Bannon, J. H., and R. P. Esser. 1975. Evaluation of citrus, hybrids, and relatives as hosts of the nematode Pratylenchus coffeae, with comments on other hosts. Nematol. Medit. 3:113-122.
7. _____, and _____. 1985. Citrus declines caused by nematodes in Florida. II. Physiological races. Fla. Dept. Agric. & Consumer Serv., Div. Plant Ind., Nematol. Circ. No. 116. 4 pp.
8. _____, J. D. Radewald, and A. T. Tomerlin. 1972. Population fluctuations of three parasitic nematodes in Florida citrus. J. Nematol. 4:194-199.
9. _____, _____, _____, and R. N. Inserra. 1976. Comparative influence of Radopholus similis and Pratylenchus coffeae on citrus. J. Nematol. 8:58-63.
10. _____, A. C. Tarjan, and F. W. Bistline. 1974. Control of Pratylenchus brachyurus on citrus and tree response to chemical treatment. Proc. Soil Crop Sci. Soc. Fla. 33:65-67.
11. _____, and A. T. Tomerlin. 1973. Citrus tree decline caused by Pratylenchus coffeae. J. Nematol. 5:311-316.
12. Suit, R. F., and E. P. DuCharme. 1953. The burrowing nematode and other parasitic nematodes in relation to spreading decline of citrus. Plant Dis. Reptr. 37:379-383.
13. Tarjan, A. C. 1971. Migration of three pathogenic citrus nematodes through two Florida citrus soils. Proc. Soil Crop Sci. Soc. Fla. 31:253-255.
14. _____, and J. H. O'Bannon. 1969. Observations on meadow nematodes (Pratylenchus spp.) and their relation to declines of citrus in Florida. Plant Dis. Reptr. 53:683-686.

Contribution No. 285, Bureau of Nematology.